

**REMARKS/ARGUMENTS**

Claims 1-16 are pending in this patent application. Claims [] have been amended. In view of a restriction requirement, claims 17-19 were not elected and, therefore, have been cancelled without prejudice to their presentation in a divisional patent application. Support for the foregoing amendments can be found in Applicants' specification at, e.g., page 5, lines 10-18.

The Office Action includes rejections under 35 U.S.C. §§ 102(b) and (e), 103(a), and 112, first and second paragraphs. In view of the remarks to follow, Applicants request that these rejections be reconsidered and withdrawn.

**Restriction Requirement**

Applicants affirm their election, with traverse, to prosecute Group I, claims 1-16.

**35 U.S.C. § 112, first paragraph**

Claims 1-16 have been rejected under 35 U.S.C. § 112, first paragraph, as allegedly containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention. Applicants respectfully traverse this rejection as the specification clearly demonstrates that Applicants were in possession of this subject matter at the time of filing.

The function of the description requirement is to ensure that the inventor had possession of, as of the filing date of the application relied upon, the specific subject matter later claimed by him; how the specification accomplishes this is not material. *In re Smith*,

481 F.2d 910, 178 USPQ 620 (CCPA 1973). The claimed subject matter need not be described *in haec verba* to satisfy the description requirement. *In re Smith*, 59 CCPA 1025, 458 F.2d 1389, 173 USPQ 679 (1972). It is not necessary that the application describe the claim limitations exactly, but only so clearly that one having ordinary skill in the pertinent art would recognize from the disclosure that appellants invented processes including those limitations. *In re Smythe*, 480 F.2d 1376, 178 USPQ 279 (CCPA 1973). A written description requirement issue involves the question of whether the subject matter of a claim is ***supported by the disclosure*** of an application as filed. MPEP § 2163.01. In this case, it is.

Applicants' respectfully submit that each limitation of the above claims is supported in Applicants' specification. Indeed, "all that is required is that [Applicants' specification] reasonably convey to persons skilled in the art that, as of the filing date thereof, the inventor had possession of the subject matter later claimed by him." *In re Edwards*, 568 F.2d 1349, 1351-1352 (C.C.P.A. 1978)(citations omitted). Significantly, for each of the claims rejected for failure to comply with the written description requirement, every recited limitation is expressly found in Applicants' specification.

For example, the Office Action alleges that the term "'insulation' layer" "begs the question of against what the other two layers are being insulated against" (Office Action at 4). Applicants' specification, however, is clear that to obtain a high activity metallocene supported catalyst is to keep the metallocene catalyst to be supported from the poisonous surface of the support without deterioration of the advantages of the supported catalyst:

[Applicants] have used a polymer to completely insulate the homogeneous catalyst to be supported from the poisonous surface of the support, thereby functioning [as] an insulation layer between the catalyst and the support. To constitute an insulation layer, the polymer should be harmless to catalyzation performances, have chemical or physical

interaction with the catalyst and support, and be insoluble in the styrenic monomer or polymerization solvent after the catalyst is loaded. Fig. 1 is a schematic drawing illustrating insulation concept of the supported catalyst according to the present invention by the insulation layer of polymer between the support and the metallocene.

(Applicants' specification at, e.g., page 5, lines 10-18).

In any event, independent claim 1 has been amended to more clearly recite that the polymer contains polar groups that insulate the metallocene catalyst from the support and, in view of the foregoing, Applicants respectfully submit that the claimed subject matter has been described *in haec verba* in their specification. Accordingly, the rejection based upon failure to comply with the written description requirement should be withdrawn.

**Rejection Under 35 U.S.C. § 112, second paragraph**

Claims 1-16 stand rejected under 35 U.S.C. § 112, second paragraph, as allegedly being indefinite. Applicants respectfully traverse this rejection.

The definiteness of a claim is evaluated in the context of whether its scope is clear to a hypothetical skilled person in the pertinent art. MPEP § 2171 at 2100-144. The Office Action asserts that the phrase "for producing a syndiotactic styrene polymer" in the preamble of claim 1 is indefinite because it is not clear whether such phrase is an intended use or a functional recitation that lacks sufficient structure to perform the recited function (Office Action at 4). Applicants respectfully submit that one skilled in the art would have no difficulty in determining that the phrase "for producing a syndiotactic styrene polymer" refers to an intended use. Since no contrary evidence or reasoning has been advanced that would show that one skilled in the art would understand such phrase to mean otherwise, Applicants respectfully request reconsideration and withdrawal of this rejection.

The Office Action also asserts that claim 1 is indefinite because the terms “high”, “surface area”, “homogenous”, “as essential (sic) component”, and “functions as (sic) insulation layer” are allegedly unclear. Although Applicants respectfully submit that one skilled in the art would understand the meaning of such terms, Applicants submit that the forgoing amendments render the rejection of claim 1 moot. Accordingly, Applicants respectfully request reconsideration and withdrawal of this rejection.

The Office Action also asserts that claim 2 is indefinite because the terms “harmless to catalyzation (sic) performances (sic)”, “interactive”, “after the catalyst is loaded” are unclear and the term “the styrenic monomer” lacked antecedent basis. Although Applicants respectfully submit that one skilled in the art would understand the meaning of such terms, Applicants submit that the forgoing amendments render the rejection of claim 2 moot. Accordingly, Applicants respectfully request reconsideration and withdrawal of this rejection.

Applicants note that the Office Action indicates numerous other bases for rejection of claims 1-16 under 35 U.S.C. § 112, second paragraph. Applicants respectfully submit that, in view of the foregoing amendments, the rejection of claims 1-16 under 35 U.S.C. § 112, second paragraph, are now moot. Accordingly, reconsideration and withdrawal of the rejections is respectfully requested.

#### **Rejection Under 35 U.S.C. § 102(b)**

Claims 1-4, 7, 9, and 13 have been rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by U.S. Patent No. 4,483,940 to Ono (“the Ono patent”). The standard of anticipation is one of strict identity, requiring disclosure in a single piece of prior art of each and every limitation of a claimed invention. *See, Rockwell Int'l Corp. v. United States*, 147

F.3d 1358, 1363, 47 U.S.P.Q.2d 1027, 1031 (Fed. Cir. 1998). Applicants respectfully traverse this rejection as the Ono patent does not disclose each and every element of Applicants' claimed invention.

Applicants' claimed invention recites a supported catalyst for producing a syndiotactic styrenic polymer comprising a support, a polymer coated onto the support, and a metallocene catalyst. In particular, Applicants' claimed invention recites that the polymer (1) contains polar groups that insulate the metallocene catalyst from the support; (2) interacts with the surface of the support; and (3) is insoluble in the styrenic monomer or polymerization solvent during polymerization after the catalyst is loaded.

The Ono patent is not directed to (nor does it disclose) a supported catalyst for producing a syndiotactic styrenic polymer. Rather, the Ono patent is directed to catalysts with improved heat-resistance for use in high temperature applications such as, for example, internal combustion engines such as those found in automobiles and gas turbine engines. Moreover, the Ono patent does not disclose metallocene catalysts. A "metallocene" is a sandwich-like molecule of cyclopentadiene and metals (see, Raymond B. Seymour and Charles E. Carraher, Jr., Polymer Chemistry An Introduction, page 355, Marcel Dekker, Inc., New York (1981) (Exhibit A attached hereto)). In contrast, the Ono patent discloses metal oxides. Since, the Ono patent does not disclose each and every element of Applicant's claimed invention, the Ono patent cannot anticipate Applicants' claimed invention. Accordingly, reconsideration and withdrawal of the rejection based on the Ono patent is respectfully requested.

Claims 1, 2, 7, and 13 have been rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by U.S. Patent No. 4,579,689 to Hershman ("the Hershman patent"). The

standard of anticipation is one of strict identity, requiring disclosure in a single piece of prior art of each and every limitation of a claimed invention. *See, Rockwell Int'l Corp. v. United States*, 147 F.3d 1358, 1363, 47 U.S.P.Q.2d 1027, 1031 (Fed. Cir. 1998). Applicants respectfully traverse this rejection as the Hershman patent does not disclose each and every element of Applicants' claimed invention.

As described above, Applicants' claimed invention recites a supported catalyst for producing a syndiotactic styrenic polymer comprising a support, a polymer coated onto the support, and a metallocene catalyst. In particular, Applicants' claimed invention recites that the polymer (1) contains polar groups that insulate the metallocene catalyst from the support; (2) interacts with the surface of the support; and (3) is insoluble in the styrenic monomer or polymerization solvent during polymerization after the catalyst is loaded.

The Hershman patent is not directed to (nor does it disclose) a supported catalyst for producing a syndiotactic styrenic polymer. Rather, the Hershman patent is directed to catalysts used in the oxidation of formaldehyde to produce carbon dioxide and water. Moreover, the Hershman patent does not disclose metallocene catalysts. A "metallocene" is a sandwich-like molecule of cyclopentadiene and metals (see, Raymond B. Seymour and Charles E. Carraher, Jr., Polymer Chemistry An Introduction, page 355, Marcel Dekker, Inc., New York (1981) (Exhibit A attached hereto)). In contrast, the Hershman patent discloses nobel metals such as, for example, platinum and palladium. Since, the Hershman patent does not disclose each and every element of Applicant's claimed invention, the Hershman patent cannot anticipate Applicants' claimed invention. Accordingly, reconsideration and withdrawal of the rejection based on the Hershman patent is respectfully requested.

**Rejection Under 35 U.S.C. § 102(e)**

Claims 1-3, 7, 9, and 13 have been rejected under 35 U.S.C. § 102(e) as allegedly being anticipated by U.S. Patent No. 6,211,113 to Harth (“the Harth patent”). The standard of anticipation is one of strict identity, requiring disclosure in a single piece of prior art of each and every limitation of a claimed invention. *See, Rockwell Int'l Corp. v. United States*, 147 F.3d 1358, 1363, 47 U.S.P.Q.2d 1027, 1031 (Fed. Cir. 1998). Applicants respectfully traverse this rejection as the Harth patent does not disclose each and every element of Applicants’ claimed invention.

As described above, Applicants’ claimed invention recites a supported catalyst for producing a syndiotactic styrenic polymer comprising a support, a polymer coated onto the support, and a metallocene catalyst. In particular, Applicants’ claimed invention recites that the polymer (1) contains polar groups that insulate the metallocene catalyst from the support; (2) interacts with the surface of the support; and (3) is insoluble in the styrenic monomer or polymerization solvent during polymerization after the catalyst is loaded.

The Harth patent is not directed to (nor does it disclose) a supported catalyst for producing a syndiotactic styrenic polymer. Rather, the Harth patent is directed to catalysts used in non-steady state heterogeneously catalyzed processes such as, for example, oxidizing alkanes to form aldehydes, carboxylic acids or carboxylic anhydrides. Moreover, the Harth patent does not disclose metallocene catalysts. A “metallocene” is a sandwich-like molecule of cyclopentadiene and metals (see, Raymond B. Seymour and Charles E. Carraher, Jr., Polymer Chemistry An Introduction, page 355, Marcel Dekker, Inc., New York (1981) (Exhibit A attached hereto)). In contrast, the Harth patent discloses the use of a metal nitride, oxide, carbide, or chloride (see, col. 2, lines 1-11). Since, the Harth patent does not disclose

each and every element of Applicant's claimed invention, the Harth patent cannot anticipate Applicants' claimed invention. Accordingly, reconsideration and withdrawal of the rejection based on the Harth patent is respectfully requested.

Claims 1, 2, 7, and 13 have been rejected under 35 U.S.C. § 102(e) as allegedly being anticipated by published U.S. Patent Application No. 2003/0007904 to Tonkovich ("the Tonkovich application"). The standard of anticipation is one of strict identity, requiring disclosure in a single piece of prior art of each and every limitation of a claimed invention. *See, Rockwell Int'l Corp. v. United States*, 147 F.3d 1358, 1363, 47 U.S.P.Q.2d 1027, 1031 (Fed. Cir. 1998). Applicants respectfully traverse this rejection as the Tonkovich application does not disclose each and every element of Applicants' claimed invention.

As described above, Applicants' claimed invention recites a supported catalyst for producing a syndiotactic styrenic polymer comprising a support, a polymer coated onto the support, and a metallocene catalyst. In particular, Applicants' claimed invention recites that the polymer (1) contains polar groups that insulate the metallocene catalyst from the support; (2) interacts with the surface of the support; and (3) is insoluble in the styrenic monomer or polymerization solvent during polymerization after the catalyst is loaded.

The Tonkovich application is not directed to (nor does it disclose) a supported catalyst for producing a syndiotactic styrenic polymer. Rather, the Tonkovich application is directed to catalysts used in hydrogen and hydrocarbon conversion reactions. Moreover, the Tonkovich application does not disclose metallocene catalysts. A "metallocene" is a sandwich-like molecule of cyclopentadiene and metals (see, Raymond B. Seymour and Charles E. Carraher, Jr., Polymer Chemistry An Introduction, page 355, Marcel Dekker, Inc., New York (1981) (Exhibit A attached hereto)). In contrast, the Tonkovich application

discloses a list of catalytically active compounds, but does not include metallocenes (see, page 3, ¶ 31). Since, the Tonkovich application does not disclose each and every element of Applicant's claimed invention, the Tonkovich application cannot anticipate Applicants' claimed invention. Accordingly, reconsideration and withdrawal of the rejection based on the Tonkovich application is respectfully requested.

**Rejection Under 35 U.S.C. § 103(a)**

Claims 1-10 and 13-16 have been rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over the Hershman patent above in view of published U.S. Patent Application No. 2002/0013217 to Herrmann ("the Herrmann application). Applicants respectfully request that this rejection be withdrawn because one skilled in the art would not have been motivated to make the combination of the Hershman patent and the Herrmann application and, moreover, such combination would not result in one of Applicants' claimed inventions.

To establish a *prima facie* case of obviousness, however, "there must be some teaching, suggestion or motivation in the prior art to make the specific combination that was made by the applicant." *In re Dance*, 160 F.3d 1339, 1343, 48 USPQ2d 1635, 1637 (Fed. Cir. 1998). "In other words, the examiner must show reasons that the skilled artisan, confronted with the same problem as the inventor and with no knowledge of the claimed invention, would select the elements from the cited prior art references for combination in the manner claimed." *In re Rouffet*, 149 F.3d 1350, 1357, 47 USPQ2d 1453, 1458 (Fed. Cir. 1998).

The Office Action fails to provide any reason why a person of ordinary skill in the art having the Hershman patent and the Herrmann application before him would have been motivated to prepare any compound or practice any method recited in instant claims 1-16.

Indeed, since both the Hershman patent and the Herrmann application teach catalyst systems in which the active metal catalyst component is *in contact with* the support, one skilled in the art would *not* have been motivated to make the proposed combination.

In this regard, Applicants' claimed invention recites a supported catalyst for producing a syndiotactic styrenic polymer comprising *three separate layers* – (1) a support layer, (2) a layer of polymer coated onto the support, and (3) a metallocene catalyst layer. Significantly, Applicants' claimed invention provides a polymer layer *between the support layer and the metallocene catalysts layer to protect the metallocene catalyst from the support itself*. As explained in Applicants' specification, Applicants have used the polymer layer (2) to completely insulate the metallocene catalyst layer (3) from the poisonous surface of the support layer (3), thereby functioning as an insulation layer between the catalyst and the support (Applicants' specification at, e.g., page 5, lines 10-18).

In stark contrast, the Hershman patent teaches that the noble metal catalyst has to be protected from certain amines that are external to the catalyst/support and which are poisonous to the catalytic activity of the noble metal (the Hershman patent at col. 1, lines 10-20). In this regard, the Hershman patent teaches that, in order to protect the noble metal from harmful amines, the noble metal must be coated with a polymer while it is *on the support*. Thus, the Hershman patent teaches that the active metal catalyst component is in *direct contact* with the support. Indeed, the Hershman patent, for example, provides a catalytic system that protects the metal catalyst component from poisons *external* to the catalytic system whereas Applicants' claimed invention provides a catalytic system that protects the metal catalyst component from poisons *internal* to the catalytic system.

The Herrmann application also teaches *direct contact* between the porous polymer support and the metallocene catalyst (the Herrmann application at, e.g., ¶¶ 10 and 157, 158). In fact, the catalyst taught by the Herrmann application comprises one layer in that all three starting components are simultaneously reacted with one another (the Herrmann application at, e.g., ¶ 158). Accordingly, one skilled in the art having the Hershman patent and the Herrmann application would not be motivated to make a supported catalyst wherein the active metal catalytic component is in a layer that is separate from the support.

Moreover, even if there was the requisite motivation to combine the Hershman patent and the Herrmann application (which there is not), such combination would not yield any one of Applicants' claimed inventions. As stated above, Applicants' claimed invention recites a supported catalyst for producing a syndiotactic styrenic polymer comprising *three separate layers* – (1) a support layer, (2) a layer of polymer coated onto the support, and (3) a metallocene catalyst layer. As explained above, both the Hershman patent and the Herrmann application teach supported catalysts are at most two layers. Thus, combination of the Hershman patent and the Herrmann application cannot result in one of Applicant's claimed inventions, i.e., a supported catalyst for producing a syndiotactic styrenic polymer comprising *three separate layers*. Accordingly, reconsideration and withdrawal of the rejections under 35 U.S.C. § 103(a) are respectfully requested.

**Miscellaneous**

Applicants have replaced the old Abstract with a new Abstract in response to the issues noted in the Office Action. A replacement sheet for the Abstract is also submitted herewith.

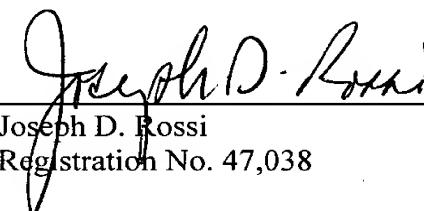
**DOCKET NO.: CHOI-0038**  
**Application No.: 09/678,171**  
**Office Action Dated: March 18, 2003**

**PATENT**

The Office Action mistakenly states that the references listed on page 3 of Applicants' specification have not yet been submitted in an IDS. Applicants respectfully submit, however, that all three references were sent in an IDS on January 16, 2001. Submitted herewith is a Communication showing that the Patent Office received Applicants' IDS on January 19, 2001, with each of the references identified on page 3 of Applicants' specification. The communication also requests that the Examiner initial a copy of PTO Form 1449 and return a copy of the initialed form to the undersigned. Accordingly, Applicants have indeed fully complied with their duty of disclosure under 37 C.F.R. § 1.56.

The drawings have been objected to for allegedly failing to comply with 37 C.F.R. § 1.84(p)(5). Applicants respectfully submit that, in view of the foregoing amendments to the specification, this objection is now moot. Accordingly, reconsideration and withdrawal of the objection is requested.

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**ABSTRACT OF THE DISCLOSURE**

**(Replacement Sheet)**

The supported catalyst according to the present invention comprises a support of organic or inorganic powder with a high-surface area, a polymer coated onto the support and a metallocene catalyst. The polymer (1) contains polar groups that insulate the metallocene catalyst from the support; (2) interacts with the surface of the support; and (3) is insoluble in the styrenic monomer or polymerization solvent during polymerization after the catalyst is loaded. The styrenic polymer powder such produced by the present invention has good flow-ability and good morphology demonstrating a great deal of industrial applicability.